

4 Summary

The data presented herein were collected from the intensive data collection survey of the UMR-IWW study areas in Pool 8, Pool 26, and La Grange. The following observations were made:

- a. Maximum magnitudes of ambient velocities within the main river at the ADCP transects ranged from 0.20 to 1.16 m/sec.
- b. Average magnitudes of ambient velocities from the fixed-depth velocity meters within the channel borders of the main river ranged from 0.10 to 0.47 m/sec. Average magnitudes of ambient velocities at the off-channel monitoring locations (backwater and side channels) ranged from 0.10 to 0.60 m/sec.
- c. Direction of travel, loading, and barge configurations play a part in the overall effect of changes in velocity magnitude and flow direction. Upbound tows caused an increase of the longitudinal velocity magnitude near the channel border, whereas downbound tows had the opposite effect. Loaded tows navigating in the upbound direction increased the longitudinal velocities near the channel border by a factor of 2 in wide channels, such as Pool 26, and by a factor of as much as 4 in narrow channels, such as La Grange Pool. The decrease in velocities caused by downbound loaded barges within the narrow channels were accompanied with a change in flow direction that ranged from 180 to 200 deg. The observed net increase or decrease in velocity magnitudes is relatively short term in duration ranging from 1.5 to 5 min.
- d. The values of maximum wave height for upbound and downbound vessels did not differ significantly. The range of maximum wave heights from barge traffic varied between 0.06 and 0.12 m. The largest wave heights observed (0.24 to 0.30 m) were produced by recreational boat traffic on the Illinois River at the La Grange study site. The maximum measured drawdown produced by passing barge traffic, 0.12 m, occurred in the main channel at the Pool 8 and La Grange Pool study areas. The maximum wave heights observed in the off-channel monitoring locations due to vessel traffic on the main river ranged from no change above background level to 0.06 m. During the study periods, no sustained winds occurred that could produce significant wind waves.

- e. The observed mean background suspended-sediment concentrations for the data collection periods ranged from 19.9 to 225 and 19.9 to 135 mg/L for the main channel and off-channel monitoring locations, respectively. Following tow passage events, increases in suspended-sediment concentrations in the main river ranged from no change above background levels to 400 mg/L. In the off-channel monitoring locations, the changes in suspended-sediment concentrations ranged from no change above background levels to 330 mg/L. Suspended-sediment concentration values at the profile locations within the main river indicate that no significant increases in the suspended-sediment concentrations were found to enter the off-channel areas for the majority of the sites visited. The majority of sediments resuspended by the navigation traffic remained in the main channel carried by the flow within the river.
- f. Pulsing of the sediment plume after a tow passage, particularly a loaded tow in the upbound direction, was found to occur at all three sites. The pulses following the tow passage may exist in the main river channel for periods of time varying from 20 to 60 min before suspended-sediment concentrations return to ambient levels.
- g. A significant increase in suspended-sediment concentration level in near-surface measurement zone generally occurred following an upbound tow passage. Downbound tows did not raise the concentrations above the measured background levels. These high levels of suspended sediment could possibly be due to a combination of the sediment plume from the passing vessel and the resuspension of nearshore sediments from the vessel drawdown and waves.
- h. A total of 69 vessel traffic events were recorded during the various trips to the study sites. Vessels during the study periods varied from small recreational vessels to large tow configurations of three barges wide by five long.